Developing a Digital Transformation Roadmap

Asset Management Digitalisation

Stefan Swanepoel

SMARTER approaches in Asset Management
SMARTER approaches in Asset Management

• Digital Transformation Overview
Agenda

Digital Transformation Roadmap

• Digital Transformation Introduction
• Digital Transformation Process
• Digital Maturity Assessment
• Digitally Transformed Business Vision
• Identify the Digital Transformation Gaps
• Devise a Digital Transformation Strategy
• Develop a Digital Transformation Roadmap
• Digital Transformation Strategy Implementation
• Measure Success
Agenda

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What is a Digital Transformation

- **Digitisation**
  - Conversion from analog information to digital

- **Digitalisation**
  - Technology induced change within industry

- **Digital Transformation**
  - Overall business / societal effect of digitalisation

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**Digitalisation focus - not all aspects of Industry 4.0**

The realignment or investment in new technology, business models, and processes to drive value for customers and employees and more effectively compete in an ever-changing digital economy. (Brian Solis, Jaimy Szymanski)
Digital Leadership Survey

- CEO understands digital opportunities and threats
  - 94% of respondents agree
  - 41% disagree

- Organisation leaders have built and communicated the digital vision
  - 89% of respondents agree
  - 13% disagree

- Organisations have clearly defined the digital strategy
  - 86% of respondents agree
  - 14% disagree

*Driving Digital Transformation: New skills for leaders, new role for the CIO (HBR 2015)*
Digital transformation is severely challenged by the following:
(Strongly Disagree, Disagree, Agree, Strongly Agree)

- Lack of data or ROI to justify value of digital transformations
- Understanding behaviour or impact of new client
- Risk management, compliance, and/or legal complications
- Resources
- Changing company culture to be agile
- Lack of digital transformation budget allocation
- Other
Why should businesses undergo a digital transformation?

**Digitalisation**
- Efficiency
- Enable scalability

**Operational excellence**
- Deal with increased complexity

**Predictability**
- Ensure transactional accuracy and security

**Digital Transformation**
- Compete in a digitised world
- Enable scalability
- Deal with increased complexity
- Ensure transactional accuracy and security
When should business digital transformation be implemented?

As the need arise (Scattered)
- Current IIoT implementation challenge
- Poor consideration of integration, support, strategic alignment
- Ultimately leads to wasted expenditure

All at once
- Resource overload
- Implementation speed penalty

Progressive roadmap
- Direction
- Priority
- Sequence
Elements of Digital Transformation

**People**
- Optimum user contribution

**Process**
- New way of doing things

**Technology**
- Human augmentation

**Content**
- Complete
- Relevant
- Accessible
- Accurate
People: User Experience crucial

User Experience
- Valuable
- Useful
- Usable
- Accessible
- Credible
- Desirable
- Findable
- Usable
- Valuable

Reduce Cognitive Load

Cognitive Barriers
- Number of Steps I Expect to Take
- Perceived Length of Each Step
- Perceived Difficulty of Each Step

Cognitive Load
- Number of Choices I Have
- Amount of Thought Required
- Confusion & Choice

SMARTER approaches in Asset Management
### People: Who should be involved?

<table>
<thead>
<tr>
<th>Leadership</th>
<th>Users</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CEO</strong></td>
<td><strong>Clients</strong></td>
</tr>
<tr>
<td>• Assemble the right team and provide overall leadership</td>
<td></td>
</tr>
<tr>
<td><strong>Head of design</strong></td>
<td><strong>Suppliers</strong></td>
</tr>
<tr>
<td>• Overall digital experience</td>
<td></td>
</tr>
<tr>
<td><strong>Head of risk management</strong></td>
<td><strong>Partners</strong></td>
</tr>
<tr>
<td>• Overall risk management</td>
<td></td>
</tr>
<tr>
<td><strong>Head of marketing</strong></td>
<td><strong>BUs &amp; Departments</strong></td>
</tr>
<tr>
<td>• Manage brand impact</td>
<td></td>
</tr>
<tr>
<td><strong>Head of information management</strong></td>
<td><strong>Community</strong></td>
</tr>
<tr>
<td>• Technology for infrastructure</td>
<td></td>
</tr>
<tr>
<td><strong>Head of strategy &amp; innovation</strong></td>
<td><strong>Staff</strong></td>
</tr>
<tr>
<td>• Consistent corporate strategy and research support</td>
<td></td>
</tr>
<tr>
<td><strong>Head of people &amp; organisation development</strong></td>
<td><strong>Users</strong></td>
</tr>
<tr>
<td>• Skills development</td>
<td></td>
</tr>
<tr>
<td><strong>Head of engineering</strong></td>
<td></td>
</tr>
<tr>
<td>• Alignment with asset, maintenance &amp; engineering requirements</td>
<td></td>
</tr>
<tr>
<td><strong>Head of operations</strong></td>
<td></td>
</tr>
<tr>
<td>• Alignment with production/operations requirements</td>
<td></td>
</tr>
</tbody>
</table>
Process: How should it be transformed?

What
- What is the process/step doing?

Why
- Why is this process/step important?

Who
- Who is involved in performing this process/step?
  - Who/what uses information emanating from this process/step?

Options
- Is the process/step still relevant and could it be digitally transformed?
- Will changes in performance, cost, risk justify digitalisation?
Technology Transformation

- On Premise
- Siloed
- Monolithic Apps
- Fragmented UX

- Cloud Based
- Open Data Flow
- IIoT & APIs
- Omni-Channel Apps

SMARTER approaches in Asset Management
SMARTER approaches in Asset Management

- Business Intelligence
- Traditional Business
- Hierarchical Org
- Single/Bi Modal IT
- AI, ML, Analytics
- Digital Business
- Network Org
- Tri-modal IT
## Technology: Top 10 Strategic Technology Trends for 2017 – Gartner

<table>
<thead>
<tr>
<th>No. 1: Artificial Intelligence and Advanced Machine Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Information system platform</td>
</tr>
<tr>
<td>- Customer experience platform</td>
</tr>
<tr>
<td>- Analytics &amp; intelligence platform</td>
</tr>
<tr>
<td>- IoT Platform</td>
</tr>
<tr>
<td>- Business ecosystem platform</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. 2: Intelligent Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Digital Twins</td>
</tr>
<tr>
<td>- Blockchains and Distributed Ledgers</td>
</tr>
<tr>
<td>No. 3: Conversational Systems</td>
</tr>
<tr>
<td>No. 4: Virtual Reality and Augmented Reality</td>
</tr>
<tr>
<td>No. 5: Digital Technology Platforms</td>
</tr>
<tr>
<td>No. 6: Mesh App and Service Architecture</td>
</tr>
<tr>
<td>No. 7: Adaptive Security Architecture</td>
</tr>
<tr>
<td>No. 8: Information system platform</td>
</tr>
</tbody>
</table>
Technology: Top 10 Strategic Technology Trends for 2018 – Gartner

Intelligent
- No. 1: AI Foundation
- No. 2: Intelligent Apps & Analytics
- No. 3: Intelligent Things

Digital
- No. 4: Digital Twin
- No. 5: Cloud to the Edge
- No. 6: Conversational Platforms
- No. 7: Immersive Experience

Mesh
- No. 8: Blockchain
- No. 9: Event-Driven
- No. 10: Adaptive Risk & Trust
Technology: What is available and how should it be used?

- Digital Twin
- Internet of Things
- Position Tracking
- Sensors
- Predictive Maintenance
- Resource Scheduling
- Rapid Development
- Partnering
- Analytics & Time Series Processing
- Asset Information Sharing
- Cognitive Systems
- Drones
- Virtual & Augmented Reality
- Platform Business

Business digitisation
- All aspects of business are being digitised

Value add focus
- Partners with incremental value offerings

Data ➔ Information ➔ Action
- Extract value from/monetise data

Human augmentation
- Work with machines (physical & virtual)

Platform business
- Many have/is part of a platform…
Technology: Asset Management Service Delivery through Platforms

**Consumer / Client**: Client Company/Staff, Assets, Client Systems

**Digitisation**: Business Intelligence, A(P)M Tools & Business Efficiency Apps, EAMS, IIoT Edge-to-Cloud, System Integration, Learning Management, Product Support

**Data Science**: Machine Learning, Cognitive Processing, Voluminous Streaming Data Store & Process

**IIoT Management**: Other Specialised Applications, Other Specialised Cloud Services

**Provider**: Contractors, ACC, FM, CM Staff, Consultants, GSS, R&D

**Mobility**: ERP, Product Management
Content: Right information at the Right Time

Complete

Accessible

Relevant

Timely

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The Pragma Strategic AM Planning Process

As is:
- Current AM performance
- Current AM capability / maturity
- Current asset condition / capacity

Risks
Technology opportunities
Legislation and regulations

Asset management strategy
- Phase 1 initiatives
- Phase 2 initiatives
- Phase 3 initiatives

Gap analysis

To be:
- AM objectives
- AM policy (statement of intent)
- Demand forecast

SMARTER approaches in Asset Management
# O.P.P.O.S.I.T.E. Approach to Digital Transformation

<table>
<thead>
<tr>
<th>Orientation</th>
<th>See people (clients and employees) differently. Appreciate differences and let it inspire the vision.</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>Understand behaviour, trends, values, expectations to reveal new opportunities.</td>
</tr>
<tr>
<td>Process</td>
<td>Develop new business models, reporting structures, supporting processes, systems and policies to enable digital transformation.</td>
</tr>
<tr>
<td>Objectives</td>
<td>Define what success looks like in the long and short term. Define client happiness and desired experiences.</td>
</tr>
<tr>
<td>Structure</td>
<td>Form a digital experience team with clear roles &amp; responsibilities.</td>
</tr>
<tr>
<td>Insights &amp; Intent</td>
<td>Continuously gather data and apply insights to adapt technologies and customer experiences to stay relevant.</td>
</tr>
<tr>
<td>Technology</td>
<td>Invest in technology that enables all aspects of the “transformed” approach through a seamless, integrated and native client (external and internal) experience.</td>
</tr>
<tr>
<td>Execution</td>
<td>Digital transformation roadmap with stakeholders that are accountable for execution and evolution of the “transformed” landscape with outcomes and metrics tied to everything.</td>
</tr>
</tbody>
</table>
Digital Transformation Process

- Current Digital Maturity
  - People
  - Process
  - Technology
  - Content
  - As is

- Digital Transformation Strategy
  - Phase 1 activities
  - Phase 2 activities
  - Phase 3 activities

- Gap analysis

- Risks
- Technology opportunities
- Legislation & regulation

- Digital Objectives
  - Digital Vision
  - Measure
  - To be

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### Maturity Levels

#### Altimeter digital transformation maturity model

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business as usual</td>
<td>• New technology sparks imagination and experimentation</td>
</tr>
<tr>
<td>Test and learn</td>
<td>• Sense of urgency accelerates</td>
</tr>
<tr>
<td>Systemise &amp; strategise</td>
<td>• Strive for relevance accelerates</td>
</tr>
<tr>
<td>Adapt or die</td>
<td>• Digital transformation in the DNA</td>
</tr>
<tr>
<td>Transformed and transforming</td>
<td>• Culture of innovation a priority</td>
</tr>
</tbody>
</table>

#### Pragma AMIP maturity model

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog</td>
<td>• Current state</td>
</tr>
<tr>
<td>Mixed</td>
<td>• Isolated digitisation</td>
</tr>
<tr>
<td>Digitised</td>
<td>• Digitised existing processes</td>
</tr>
<tr>
<td>Digitalised</td>
<td>• Digitally transformed asset management</td>
</tr>
<tr>
<td>Transformed</td>
<td>• Comprehensive business-wide digitally transformed</td>
</tr>
</tbody>
</table>
People

Responsibility

• Who gives direction, drives initiatives and are accountable for outcomes?

Participation

• Who takes part in the digital transformation process?

Skills

• Are required digitalisation technology skills available?
• Does staff have the skills to participate & add value in the digitalised business processes?
Process

Completeness
• To what level have processes being digitalised?

Contextual information
• Do processes incorporate/make available other contextual information related to the process?

Automation & intelligence
• To what level is intelligence data use automated in the process?

Operational integration
• How quick and sophisticated are integrations with other relevant processes?
Technology

Architecture
• Is the digital enterprise architecture flexible and open to allow extension and evolution?

Platform
• Are solutions delivered through mature technologies?

Workflow
• Are workflows providing users a seamless experience across systems?

Integration
• How quick and sophisticated are integrations with other relevant systems?
Completeness & relevance

• Are digital records complete and supplemented by external data, limited to what is relevant at the point of use?

Master data

• Is consistent master data used across all systems?

Accuracy

• Is data accurate?

Governance

• Is there formalised processes to control data quality and anomaly detection?

Searchability & utilisation

• Can data be accessed and searched from the corporate BI platform, used in data science platform and used to derive value?
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Good asset management has clear connectivity between an organisation’s strategic plan (commonly called the business or corporate plan) and the asset management activities delivered by staff. This is known as alignment or “line of sight” and enables everybody to understand how they contribute to achieving success.
ISO 55001: Deployment of Objectives

Stakeholder and organisational context

Organisational plans and organisational objectives

Strategic asset management plan (SAMP) AM objectives

Asset management policy

Asset management plans

Plans for developing AM system + relevant support

AM system + relevant support elements

Implementation of asset management plans

Asset portfolio

Performance evaluation and improvements

Source: ISO 55002 2014 Appendix B
Digitally Transformed Business: Statement of Intent

For each element in the AM framework:

What is the end state vision?

What does success look like?

“Dynamic resource scheduling, allocation and tracking of all work with relevant work instructions at the point of work and continuous feedback.”

“Resources will be optimally deployed to complete the required maintenance work with the relevant information at hand and accurate feedback.”
Evolving Vision

- Technology continues to evolve and improve
- Vision could stagnate if unable to move beyond initial successes
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SMARTER approaches in Asset Management

Gap Analysis

**Process**
- Understand underlying requirements related to gap
- Decide how processes should change

**People**
- Clarify roles
- Identify required skills

**Content**
- Identify missing information
- Irrelevant information

**Technology**
- Gaps in overall architecture
- Functional gaps in platform based solutions
## Gap Analysis

### Digital Ecosystem

<table>
<thead>
<tr>
<th>Element</th>
<th>Sub area</th>
<th>Gap description</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td>Leadership</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Execution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Participation</td>
<td></td>
</tr>
<tr>
<td>Process</td>
<td>Completeness</td>
<td></td>
</tr>
<tr>
<td>Tech. Platforms</td>
<td>ERP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CMMS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business Intelligence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Industrial Internet of Things</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rapid Application</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development/BPM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Science / Advanced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Processing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Production Management</td>
<td></td>
</tr>
</tbody>
</table>
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• Identify the Digital Transformation Gaps

**Devise a Digital Transformation Strategy**

• Develop a Digital Transformation Roadmap
• Digital Transformation Strategy Implementation
• Measure Success
Digital Transformation Implementation Strategy

- Staffing & advisors
- Technology
- Change management
- Data analysis
- Security
- Scorecard
- Governance
- Value & Funding
# Implementation Strategy

## Digital Transformation Implementation Strategy

**Staffing & Advisors**

Who will implement the strategy?

**Technology**

Where/how will the required technology be obtained (Build/Buy/Sell/Contracted)?

**Change Management**

Which areas of the organisation and stakeholders will be impacted and how will the impacts be managed?

**Data Analysis**

How will the use of available data be maximised?

**Security**

What data will be generated and how will it be secured?
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The Pragma Way for Mining and Minerals

Enterprise Asset Management Road Map

- Sustain
- Well-being
- Optimise
- Improve
- Diagnose
- Strategise
- Comply
- Stabilise

The BIG EAM Picture starts here
<table>
<thead>
<tr>
<th>Process</th>
<th>Digital Ecosystem</th>
<th>Health &amp; Safety</th>
<th>Performance Management</th>
<th>Asset Register &amp; ACPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>People</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Content</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sequencing Transformation Activities

<table>
<thead>
<tr>
<th>Process &amp; Content</th>
<th>Clear understanding of gap / requirement 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>Stay in business 2</td>
</tr>
<tr>
<td></td>
<td>Statutory compliance</td>
</tr>
<tr>
<td></td>
<td>Optimisation (P, C, R)</td>
</tr>
<tr>
<td></td>
<td>Time to impact</td>
</tr>
<tr>
<td>Priority</td>
<td>How urgent is it to transform / replace this business process / function? Ex. how quickly will my competition start using this to outperform me? 2</td>
</tr>
<tr>
<td>Other process transformations 3</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>Technology availability / maturity / cost 4</td>
</tr>
<tr>
<td></td>
<td>Technology that must be available at the right maturity and cost in the preferred platform.</td>
</tr>
<tr>
<td>People</td>
<td>Skills development / sourcing; Change management 5</td>
</tr>
<tr>
<td></td>
<td>Skills availability to implement, support and use the technology. Change management plan in place?</td>
</tr>
</tbody>
</table>
Sequence Transformation Activities

Digital Ecosystem - Roadmap Element Sequence
Transformation Initiative

<table>
<thead>
<tr>
<th>Gap / Requirement Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process</td>
</tr>
<tr>
<td>People</td>
</tr>
<tr>
<td>Tech.</td>
</tr>
<tr>
<td>Content</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value contribution</th>
<th>Value range</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stay in business need</td>
<td>Minimal (1)</td>
<td>Significant (10)</td>
</tr>
<tr>
<td>Statutory requirement</td>
<td>No (1)</td>
<td>Yes (10)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Value element</th>
<th>Value range</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance benefit</td>
<td>Minimal (1)</td>
<td>Significant (5)</td>
</tr>
<tr>
<td>Cost benefit</td>
<td>Minimal (1)</td>
<td>Significant (5)</td>
</tr>
<tr>
<td>Risk treatment benefit</td>
<td>Minimal (1)</td>
<td>Significant (5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time to impact</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2+ years</td>
<td>(1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Importance range</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor (1)</td>
<td>Critical (5)</td>
</tr>
<tr>
<td>Minor (1)</td>
<td>Critical (5)</td>
</tr>
<tr>
<td>Minor (1)</td>
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<td>Minor (1)</td>
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John Kotter’s model for Change Management
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Digitalisation innovations
- Capture and track number of digitalisation innovations identified vs. implemented

Data velocity
- Time from capture to being available for decision making in digital platform

Integration
- Ratio of internal inter system / platform integrations automated vs. total potential integrations
- Ratio of partner / client transaction automations vs. total

Platform maturity
- Number of standalone desktop/applications tools still in use for business critical functions

App & API usage
- Track usage of Apps and APIs available

Partnering
- Track cost of in-house development vs. partner developed vs. purchased off the shelf

User experience
- Quantitative user experience surveys

Value unlock
- Quantified value creation through digitalisation

Digital twin realisation
- % of meter/condition/location reading points automatically updated in EAMS
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Thank you

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